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Abstract: This research on the golden-cheeked warbler (GCW) was conducted on Fort Hood, Texas, during April and June 2006. Subject matter experts on Fort Hood were consulted and helped determine which areas of the installation contained suitable GCW habitat but were not already included in The Nature Conservancy's intensive study program. Researchers then surveyed one of these areas, documenting the presence of GCW. This research was conducted to determine if data collected in the intensive study area has been successfully extrapolated to other areas of habitat on the installation.

The collected data showed that the territory density was lower than those found on TNC's intensive study areas, but pairing success was very similar to the TNC data, and the number of territorial males producing ≥ 1 fledgling was considerably higher than TNC's estimates.

This study supports the possibility of extrapolating TNC's data to areas on Fort Hood that have not been intensively sampled. However, the small scope of this project and relatively low sample size make it necessary to preface the results with one caveat: additional years of data collection on this study site would equate to a higher measure of confidence in the results.

Executive Summary

This research on the golden-cheeked warbler (GCW) was conducted on Fort Hood, Texas, during April and June 2006. Subject matter experts on Fort Hood were consulted and helped determine which areas of the installation contained suitable GCW habitat but were not already included in The Nature Conservancy's (TNC's) intensive study program. Researchers then surveyed one of these areas, documenting the presence of GCW, the numbers of birds seen or heard, and the demographics of the species within this new study area. This research was conducted to determine if data collected in the intensive study area has been successfully extrapolated to other areas of habitat on the installation.

The collected data showed that the territory density was lower than those found on TNC's intensive study areas, which may be the result of a lower number of territorial males present here due to habitat constraints, but pairing success was very similar to the data collected by TNC. However, the number of territorial males producing ≥ 1 fledgling observed in this study was considerably higher than TNC's estimates. This may be due to inaccurate identification of unbanded males on the study area. When unbanded males live in adjacent territories, it is possible to observe the same male at varying times and locations and assume it was two or more different birds.

This study supports the possibility of extrapolating TNC's data to areas on Fort Hood that have not been intensively sampled. However, the small scope of this project and relatively low sample size make it necessary to preface the results with one caveat: additional years of data collection on this study site would equate to a higher measure of confidence in the results.

Contents

Figures and Tables

Figures

Tables

Preface

This report is a deliverable product under military interdepartmental purchase request (MIPR) MIPR5L48R00091, "Environmental Survey for Fort Hood om Support of NEPA Requirements." This work was funded by the U.S. Army Environmental Center, SFIM-AEC-EQN. The Technical Monitor was Steve Sekscienski.

This report was prepared by Bruce MacAllister and Tim Hayden, Ecological Processes Branch (CN-N), Installations Division (CN), Construction Engineering Research Laboratory (CERL), U.S. Army Engineer Research and Development Center (ERDC), Michael Baranski, Jones Technology, and Rebecca Peak, The Nature Conservancy under the general supervision of Alan B. Anderson, Chief CN-N; Dr. John T. Bandy, Chief CN, and Dr. Ilker Adiguzel, Director, CERL. Technical supervision was provided by Dr. William D. Severinghaus, Technical Director.

COL Richard B. Jenkins was Commander and Executive Director of ERDC. Dr. James R. Houston was Director.

Unit Conversion Factors

Multiply	By	To Obtain
acres	4,046.873	square meters
degrees Fahrenheit	(F-32)/1.8	degrees Celsius
feet	0.3048	meters
hectares	1.0 E+04	square meters
inches	0.0254	meters
miles (U.S. statute)	1,609.347	meters
pounds (mass)	0.45359237	kilograms
square feet	0.09290304	square meters
square miles	2.589998 E+06	square meters

1 Introduction

Background

Fort Hood currently provides the infrastructure and training lands for the 1st Cavalry Division and the 4th Infantry Division (Mech), III Corps Headquarters and its combat aviation assets, combat support, and combat service support units. The 2005 Base Realignment and Closure (BRAC) Commission cited limitations in available maneuver training acreage as one of the reasons for recommending relocating Brigade Combat Teams and other support and combat element temporarily stationed at Fort Hood to Fort Carson, Colorado, and Fort Bliss, Texas. Although the net change from 2003 to 2011 in assigned personnel on Fort Hood as a result of BRAC initiatives will be negligible, the findings of the BRAC commission have resulted in increased evaluation of available military range lands on Fort Hood to support training activities. Historically, the eastern training ranges of Fort Hood north of Belton Lake (Land Groups 1 and 2) have received only limited use by mechanized units due to terrain and vegetation constraints. However, as training requirements increase use of all available training lands, these under-utilized ranges are receiving increased pressure to support additional training activities. These two land groups on Fort Hood also support the largest contiguous habitat area on the installation for the federally endangered golden-cheeked warbler. As a result of potential effects on populations and habitats of this endangered species, significant changes in the military use of Land Groups 1 and 2 could trigger compliance actions under both the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA). This effort will provide the installation baseline golden-cheeked warbler population and habitat use data that have not been previously collected in these land groups. These data can be used by installation land managers to assess effects of potential changes in mission activities in these land groups in compliance with NEPA and ESA requirements.

The golden-cheeked warbler (*Dendroica chrysoparia*) is a federally endangered migratory passerine with a breeding range endemic to the range of Ashe juniper (*Juniperus ashei*) on the Edward's Plateau of central Texas. The golden-cheeked warbler (GCW) is a medium sized warbler characterized by a distinctive black head, yellow face, and thin black eyeline. The GCW is entirely dependent upon the mature Ashe juniper forests

of central Texas for nesting and foraging. The species builds its nests almost entirely from shredded juniper bark at a height of 4 to 5 meters above the ground, most commonly in Ashe juniper and occasionally in the hardwoods common to the region (e.g., live oak, Texas oak; Pulich 1976). Only mature Ashe juniper trees shred their bark, limiting the golden-cheeked warbler to forests with a high proportion of juniper trees that are older than 40 to 50 years (Pulich 1976). Warblers, however, rarely exist in stands of pure juniper, as they also require the hardwoods that support the insect populations on which they forage. For a more detailed description of the golden-cheeked warbler and its habitat, see Pulich (1976).

The golden-cheeked warbler was listed as endangered in 1991 under the ESA of 1973, as amended due to degrading and increasingly fragmented habitat, which caused the decline in their population (Benson 1990). Pulich (1976) estimated the breeding population to be approximately 14,950 birds. In 1990, Wahl, Diamond, and Shaw estimated there were 4,822 to 16,016 breeding pairs but believed that their estimation of breeding pairs was “unrealistically” high. In 1995, the species was believed to breed in at least 24 central Texas counties, a reduction of 23percent from 1976 estimates (31 counties; Pulich 1976; U.S. Fish and Wildlife Service [USFWS] 1996). But since then, their numbers have been slowly increasing due to the efforts of natural resource managers responsible for overseeing the Army’s endangered species program at Fort Hood, Texas, and organizations like The Nature Conservancy, which conducts extensive research efforts and conservation activities on the installation. It is currently estimated that approximately 21,422 ha (52,935 ac) of suitable GCW habitat occur on Fort Hood (Hayden et al. 2001). Using GCW densities from areas intensively studied by TNC, the population on Fort Hood is currently estimated to range from 2,901 to 6,040 singing males. Observed density in 2003 on intensive study plots was 0.21 males/ha, which when extrapolated to all available habitats produces an estimate of 4,514 territorial males (Peak 2003). For a more detailed habitat description of Fort Hood, see Tazik and Cornelius, 1993.

Fort Hood is located in Bell and Coryell counties in east central Texas. The Edwards Plateau and the breeding range of the GCW contain much of this installation. Vegetative cover on this installation varies with slope, aspect, moisture, and historic usage (cattle grazing, military activities, etc.). Vegetation here consists of grassland, open savannah, hardwood thickets, and dense Ashe juniper-oak stands. Fort Hood is one of the largest Army in-

stallations, boasting the highest number of active duty armor personnel in the United States Armed Services. It covers a total of 339 square miles (878 sq km) and is the only post in the United States that supports two full armored divisions. As such, the training that occurs on Fort Hood is substantial. This training has, over the years since the GCW was listed, been impacted by known, unknown, or potential disturbances to this endangered species. Since populations of GCWs as well as other neotropical migrants are known to be less stable in areas with increased disturbance and/or habitat manipulation (Benson 1990, Engels 1995) restrictions have been placed on military training activities in and around GCW habitat on the installation.

Objectives

The objectives of this work were to determine and document (1) demographic parameters (return rates, dispersal distances, productivity, and mated status) affecting population status and (2) occurrence of the golden-cheeked warbler in nonintensively studied habitat on Fort Hood, Texas, in support of NEPA and ESA requirements.

Approach

This research on the golden-cheeked warbler was conducted on Fort Hood, Texas, during April and June 2006. Subject matter experts on Fort Hood were consulted and helped determine which areas of the installation would contain suitable GCW habitat that was not already included in The Nature Conservancy's intensive study area. Researchers then surveyed these areas, documenting the presence of GCW and the number of birds seen or heard. Researchers also set about following the same protocol TNC currently uses for monitoring these birds in the intensive study areas established in 1991. This work included determining territory location and size, mated status, and productivity. The research work consisted of systematically surveying possible golden-cheeked warbler habitat, color-banding adults, and monitoring the newly established study area to determine species productivity. These data were then compared to those gathered by TNC and used to extrapolate GCW population trends across the entire installation. Data from these studies were compiled and analyzed, and recommendations were made regarding future monitoring and management of the golden-cheeked warbler population on Fort Hood, Texas.

Mode of Technology Transfer

This research contributes to a fundamental understanding of the ecology of the endangered golden-cheeked warbler, and serves as an example of a proactive approach to endangered species management on Army lands. This and other related reports are being transmitted to military, land, and wildlife managers at Fort Hood, Texas; The Army Environmental Center (AEC); and the Department of the Army for use in ESA and NEPA compliance efforts. This report will also be made accessible through the World Wide Web (WWW) at URL: http://www.cecer.army.mil.

2 Methods

Establishing a New GCW Study Area

The Nature Conservancy has three Intensive Study Areas (ISAs) located on Fort Hood, Texas, where GCW population monitoring has been ongoing since 1992 (Peak 2005). Demographic data such as territory size and density, age structure, mated status, males producing ≥ 1 fledgling, and nest monitoring data have been gathered each year since then. This data can be used to monitor population changes over time and to estimate possible causes in the increase/decrease of a population (DeSante and Rosenberg 1998, Manley 1993). Data collected in the ISAs are used to extrapolate GCW demographics across the entire extent of the habitat available on Fort Hood, and give a picture of what is happening on the installation as a whole.

For this project researchers established a 1-year intensive study plot to provide baseline data for population status in an area with the potential to see increased military training activity. These efforts will also attempt to evaluate whether data from other research plots on Fort Hood, which have been intensely monitored, can be extrapolated to habitat areas that are currently undersampled. For the purpose of this study, TNC data from 2003-2006 were used in the comparison of the 1-year plot to the well studied areas. Because changes were made to the survey protocol prior to the start of the 2003 field season (Peak 2003), data from previous years were not included for this comparison.

Study Plot

The study area was located on the eastern part of Fort Hood, north of Cowhouse Creek and on the western edge of the Owl Creek Mountains. It was primarily located in the eastern part of Training Area (TA) 13, but also included the northwest part of TA 22 and the northern part of TA 21 (Figure 1). The study area encompassed 164 ha.

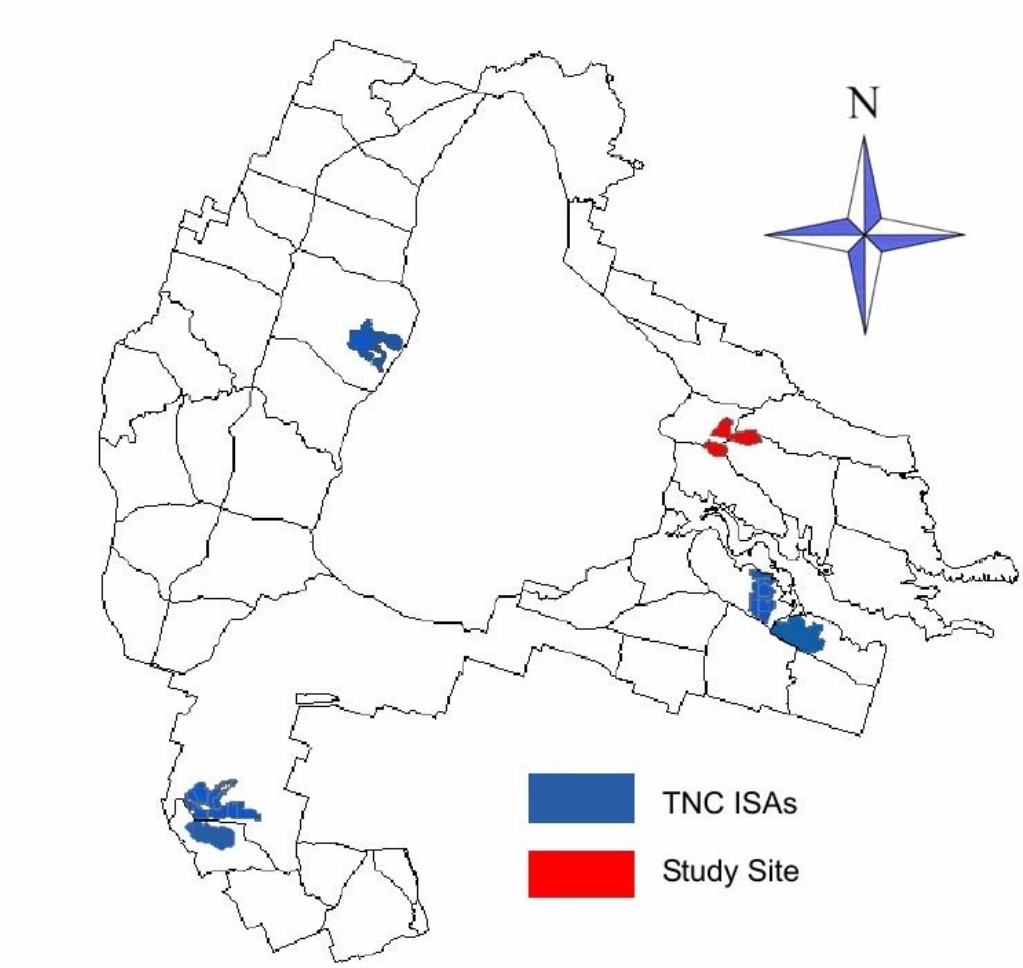

Figure 1. TNC Intensive Study Areas and ERDC-CERL Study Area on Fort Hood, Texas.

Territory Mapping/Observational Surveys

Males observed/heard in a specific area over consecutive visits were considered to have an established territory and therefore were continuously monitored throughout the field season. Observations were made in each territory at least twice a week for approximately 1 hour each visit. Global Positioning System (GPS) locations in the form of Universal Transverse Mercator (UTM) coordinates, were taken for the targeted individual approximately 30 and 60 minutes into each visit using a Garmin V handheld GPS receiver. Point locations of territorial males were taken approximately

30 m apart from one another. During survey periods all relevant behaviors of males/females/fledglings were recorded; including but not limited to: presence/absence of adults or fledglings, individuals seen with nesting materials, food delivery, and nest monitoring. Due to the inaccessibility of some areas of the study plot, some individuals were monitored at less frequent intervals than others.

Banding

Banding of individuals was initiated on 19 April and continued through the length of the field season, until 30 June. Banding attempts consisted of using mist nets, sound equipment including an MP3 digital audio player with speaker, appropriately sized U.S. Fish and Wildlife Service (USFWS) numbered aluminum bands and a variety of colored plastic leg bands. Nets were set up within a male's territory and individuals were attracted to the nets using a variety of recorded GCW songs and calls. Attempts lasted no longer than 15 minutes and no more than 5 netting attempts were conducted on an individual. Captured GCWs were fitted with a USFWS band along with a unique combination of color bands to allow for accurate subsequent identification of individuals at a distance. Age and sex of each individual GCW were recorded using guidelines from Pyle (1997), as well as appropriately refined guidelines (Tim Hayden, personal communication, Biologist, ERDC-CERL). All individuals were aged and placed in one of four categories: HY (hatch year), SY (second year), and ASY (after second year). When, after examining all useful characteristics, the age of a bird could not be determined, it was recorded as AHY (after hatch year). All nontarget species were extracted from the net and released without banding. UTM coordinates of all successful banding locations were recorded using a GPS receiver. Banding attempts were made for both adults and fledglings.

Productivity

While conducting the observational surveys researchers collected data on pairing success and the percent of territorial males producing one or more fledglings. A male was considered to be paired if a female was seen within the male's territory on at least three separate visits. A male was considered to have produced ≥ 1 fledgling if researchers observed a male feeding fledglings or carrying food to an area in its territory when fledglings where known to be present.

Nest searching was conducted on all monitored territories. Researchers attempted to determine the locations of nests using either behavioral cues from territorial adults or through systematic searches of territories suspected to contain a nest. When a nest was located and positively identified, a GPS location was taken and flagged at least 5 m away from the nest and monitored every 3 days. Monitoring was conducted as close to sunrise as possible to limit stress on the nesting pair and to gather information on status and stage of nest cycle. Information on hatching and fledging dates as well as behavior of adult birds was gathered.

Data Analysis

Territory density was calculated by dividing the number of territorial males found on the study by the total area of the study area. This assumes all territories are equal in size. Researchers calculated the approximate size of each territory by plotting the GPS points of each territorial male on a map of the landscape using ArcGIS 9; then using the polygon-drawing feature in ArcMap to draw a line around the cluster of observation coordinates associated with each male. This polygon represents a very rough estimate of each bird's territory based on the average of the boundary points. The software is able to calculate and map the exact area for each polygon representing a territory, but again this is only an estimate of the actual size and shape of territorial boundaries. The same method was used to calculate the area of the entire study plot.

To estimate mated success, the number of paired territorial males was divided by the total number of territorial males. If a female was observed within a male's territory on at least three occasions, the male was considered to be paired. Other date included the number of paired males that produced ≥1 fledgling divided by the total number of territorial males and the total number of paired males. To estimate the number of fledglings per paired male, the total number of observed fledglings was divided by the number of paired males.

To calculate the age structure, the number of SY and ASY birds was divided by the total number of aged adults found within the study area.

3 Results

Thirty territories were present on the 164-ha study area (18.3/100 ha). Territories ranged in size from 1.58 ha to 6.87 ha with an average territory size of 3.39 ha (95% CI 2.89 ha - 3.89 ha; Figure 2). If territories were distributed evenly over the study area, overall territory density would be 1 territory per 5.46 ha or 0.18 territories per ha. But there was some overlapping (Figure 2).

Over the course of the field season, we banded 17 golden-cheeked warblers (Appendix 1), including 15 (88%) territorial males and 2 (12%) females. Of the 15 males, 12 (80%) were ASY, and 3 (20%) were SY (Figure 3). Of the 2 females, one was ASY (50%) and one was AHY (50%) due to indeterminate age characteristics. One previously banded male was located on the study area: RD/BL : OR/SI, USFWS 2310-93620.

Of the 30 monitored territorial males, 24 (80%, 95% CI 95.16 - 64.81%) were paired. Of the 30 territorial males, 22 (73.33%, 95% CI 56.54 - 90.12%) were successful in producing ≥ 1 fledgling and out of the 24 paired males, 22 (91.67%, 95% CI 79.75% - 100%) were successful in producing ≥ 1 fledgling. Sixty-four fledglings were observed, yielding an average of 2.13 (95% CI 1.60 – 2.67) per territorial male, 2.67 (95% CI 2.22 – 3.11) per paired male, and 2.91 (95% CI 2.61 – 3.21) per successful male.

Between the age classes the average fecundity was very similar for mated SY (n = 2) males was 3.0 young per paired SY. The average for paired ASY (n = 22) males was 2.64 young per paired ASY. Productivity between the age classes for successful SY (n = 2) males was the same at 3.0 but higher for successful ASY males at 2.9 (n = 20) per successful ASY male (Figure 4). These averages may be skewed due to small sample size.

Territory	Size (ha)	Mated Status
1	4.06	Y
2	3.21	Y
3	1.84	N
4	2.84	N
5	1.98	Y
6	2.78	Y
7	1.58	Y
8	1.74	N
9	1.91	N
10	2.66	Y
11	2.47	Y
12	2.72	Y
13	5.78	Y
14	1.71	Y
15	5.27	Y

Territory	Size (ha)	Mated Status
16	4.10	Y
17	2.91	Y
18	4.39	Y
19	3.18	Y
20	3.49	N
21	5.39	Y
22	4.20	N
23	4.96	Y
24	4.61	Y
25	2.71	Y
26	1.62	Y
27	2.31	Y
28	3.65	Y
29	4.63	Y
30	6.87	Y

Figure 2. Territory size/location and mated status of territorial males on Study Area.
Cross-hatching illustrates an overlap in territories and is used as a visual aid to distinguish continuous boundaries

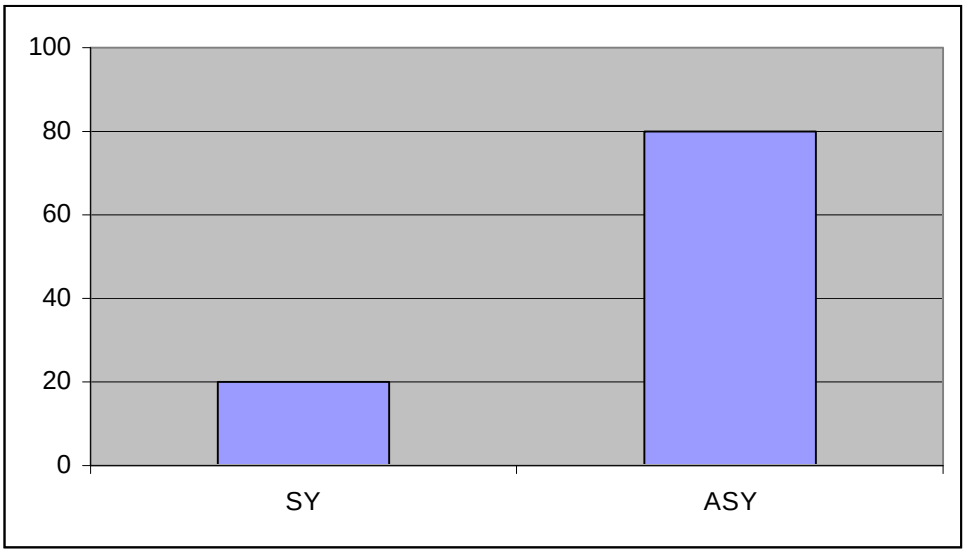

Figure 3. Age structure of banded territorial males on study area.

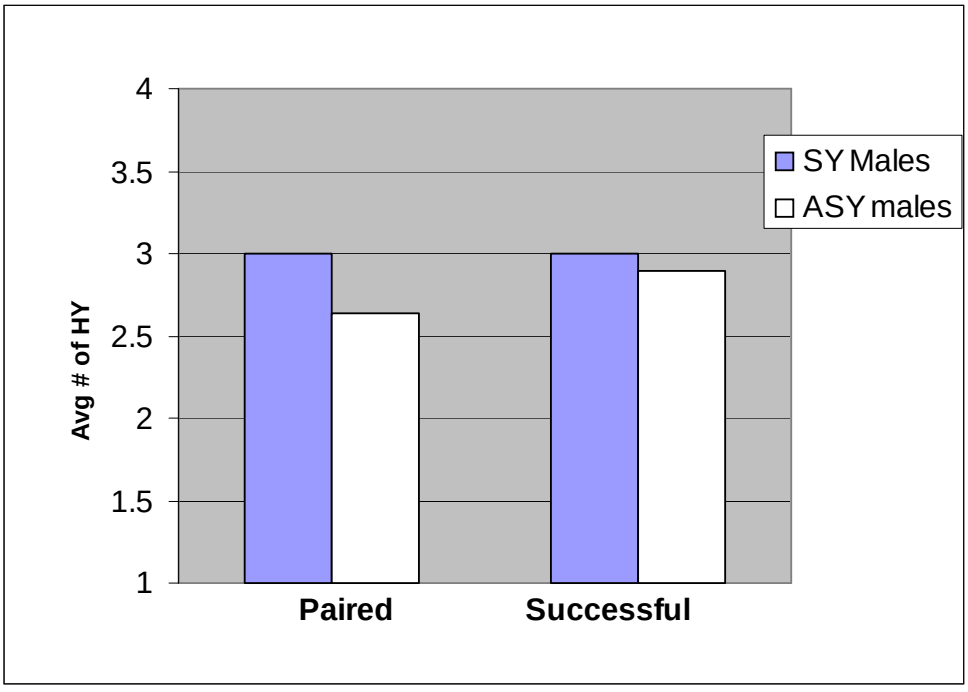

Figure 4. Productivity of SY territorial males and ASY territorial males.

Two nests were found while monitoring territorial males in the study area. Both nests were monitored according to protocol. The first nest was discovered on 10 April 2006 and the young fledged on 8 May 2006. The nest contained 3 nestlings, which was the same number of fledglings observed being fed by both adults for at least 3 weeks within its territory. The second nest was found on 17 May 2006 with a female incubating. Observations were made of both adults feeding an unknown number of nestlings but the final outcome of the nest was unknown. The last observation was made on 5 June 2006 and an empty nest was found. Numerous attempts to locate the fledglings were unsuccessful.

4 Discussion

Territory density was lower than those found on TNC's ISAs (2003 – 0.21 N= 167; 2004 – 0.25 N = 158; 2005 – 0.24 N = 148; 2006 – 0.24 N = 174) (Table 1, Peak 2006). This may be the result of a lower number of territorial males due to habitat constraints (food, suitable nesting substrate, predators) or overall size of territories may have been larger than territories found on TNC's ISAs. Unfortunately TNC did not gather territory size data on each territorial male they monitored; therefore we cannot compare estimates. When comparing the current data to other studies, territory size collected in this study seems to fall somewhere in the middle of territory size estimates (0.81 - 2.55 ha [Pulich 1976] and 4.44 - 8.48 ha [Kroll 1980]). The fact that only 15 out of 30 males were banded within the study area may have lead to inaccurate identification of males. An over- or underestimation of the number of territory males could have occurred. The sample size is also considerably smaller than that collected by TNC, which allows for a higher rate of sampling error.

Table 1. Overall territory density.

Study Area	Territory Density/ha
TNC 2003	0.21
TNC 2004	0.25
TNC 2005	0.24
TNC 2006	0.24
Study Area 2006	0.18

Pairing success was very similar (2003 – 82%; 2004 – 78.4%; 2005 – 88.5%; 2006 – 89%; Figure 5; Peak 2006). A territorial male was classified as paired by having researchers observe a female on the territory at least three times. The protocol was a bit more stringent than TNC's, which considered a male paired if a female was observed on the territory only once (Peak 2005). However, the current pairing success rate would remain unchanged if the protocol was changed to match that observed by TNC.

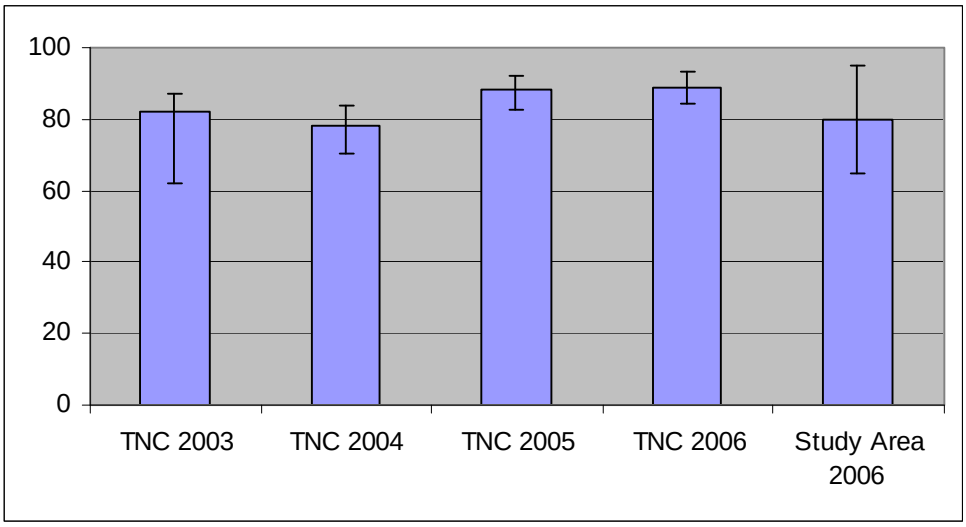

Figure 5. Pairing success of territorial males

The number of territorial males producing ≥ 1 fledgling was considerably higher than TNC's estimates (2003 – 56.3%; 2004 – 55.06%; 2005 - 60.8%; 2006 – 55.8%; Figure 6; Peak 2006). The current protocol was the same as TNC's but possible inaccurate identification of non-banded males may have skewed the data. (When non-banded males live in adjacent territories, it is possible to observe the same male at varying times and locations and assume it was two or more different birds.) In previous studies, unmated males that have not produced any of their own fledglings have been observed feeding fledglings (Pekins 2002). These fledgling also form mobile groups that may venture beyond their delineated natal territories, further complicating identification.

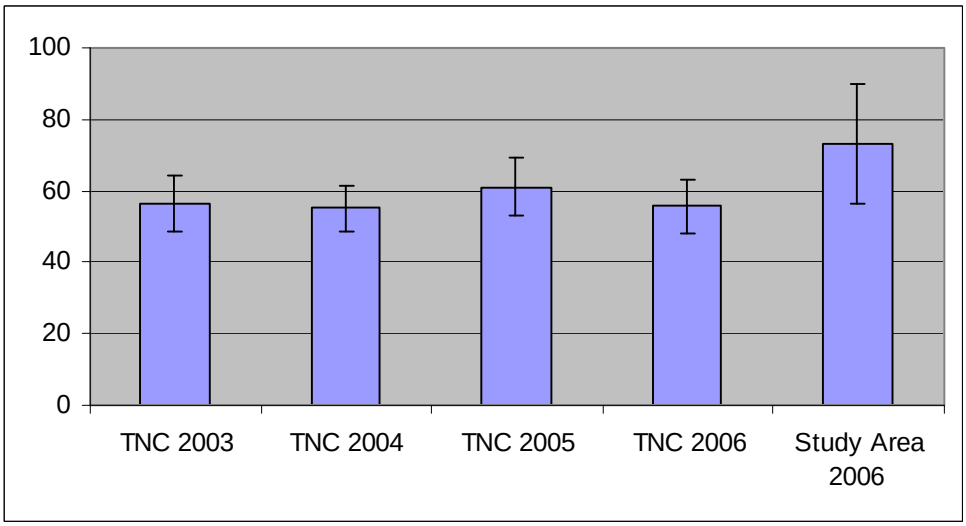

Figure 6. Number of territorial males producing ≥ 1 fledgling.

Age structure between study areas will not be compared. On TNC ISAs, banding has occurred for more than 10 yrs and there is historical information on the estimated age of many of the territorial males. For this study all males captured were not banded and thus could only be put into 2 categories (ASY and AHY).

In conclusion; this study supports the possibility of extrapolating TNC's data to areas on Fort Hood, Texas, that have not been intensively sampled. But considering the sample size, it may be necessary to compile additional years of data from this study site or others to gain a higher measure of confidence. It is also important to mention that the data collected was from the tops of mesas, because these are the areas that are most likely to be impacted due to the increase of military training. Data collected from slopes and the bottoms between mesas around Fort Hood may yield different results. Future work should include a protocol for sampling from these areas as well.

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Appendix A: Banding Data

Band No.	Color Comb.	Age	Sex	Date	Location (UTM)	
2410-77001	BL/BK:NB/SI	ASY	M	4/19/2006	631966	3455162
2410-77002	OR/RD:NB/SI	AHY	M	4/21/2006	633314	3455221
2410-77006	BK/BL:NB/SI	ASY	M	4/25/2006	631950	3455155
2410-77007	BK/WH:NB/SI	ASY	M	4/25/2006	632006	3455082
2410-77008	BK/OR:NB/SI	ASY	M	4/26/2006	632537	3455525
2410-77009	GR/OR:NB/SI	ASY	M	4/26/2006	632229	3455615
2410-77010	GR/GR:NB/SI	ASY	M	4/26/2006	632627	3456132
2410-77013	RD/BK:GR/SI	ASY	M	4/27/2006	633176	3455396
2410-77014	NB/YE:WH/SI	SY	M	5/1/2006	632135	3454938
2410-77015	RD/SI:NB/RD	ASY	M	5/4/2006	632170	3454938
2410-77016	OR/OR:BL/SI	SY	M	4/28/2006	632608	3456303
2410-77018	GR/WH:OR/SI	ASY	M	5/15/2006	632271	3455614
2410-77019	BL/BL:GR/SI	ASY	M	5/16/2006	633573	3455640
2410-77020	NB/YE:GR/SI	ASY	M	5/16/2006	633191	3455606
2410-77021	WH/BL:NB/SI	ASY	F	5/31/2006	632205	3455557
2410-77022	BK/BK:NB/SI	AHY	F	6/2/2006	633180	3455304

Appendix B: Observational Data on GCW Territories 1-30

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
MB	30-Mar	632630	3456316	632656	3456308	y	y	n	n	n	
MB	1-Apr	632642	3456288	632655	3456284	y	y	n	n	n	
MB	8-Apr	632647	3456266	632618	3456227	y	y	y	n	n	
MB	8-Apr	632704	3456303	632563	3456214	y	n	n	n	n	Nest found
MB	10-Apr	632640	3456256	632612	3456200	y	y	n	n	n	
MB	12-Jan	632608	3456303	632610	3456240	y	y	n	y	n	
MB	16-Apr	632617	3456269	632577	3456156	y	n	n	y	n	
MB	24-Apr	632611	3456293	632577	3456272	y	y	n	y	3	
MB	26-Apr	632657	3456307								Lost group

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
MB		632399	3455867	632471	3456002	y	n	n	n	n	
MB		632385	3455903	632445	3456017	y	n	n	n	n	
MB		632416	3455896	632433	3455935	y	n	n	n	n	
MB		632373	3455949	632476	3455889	y	n	n	n	n	
MB		632389	3455995	632430	3455875	y	n	n	n	n	
MB		632426	3455019	632469	3455865	y	n	n	n	n	No female observed
MB		632471	3456050	632438	3456012	y	n	n	n	n	
MB		632522	3456038	632503	3456053	y	n	n	n	n	
MB		632503	3455980	632447	3455903	y	n	n	n	n	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
MB	18-Apr	632405	3455740	632401	3455751	y	n	n	n	n	
MB	21-Apr	632389	3455714	632403	3455751	y	n	n	n	n	Previously banded
MB	3-May	632404	3455785	632394	3455783	y	n	n	n	n	
MB	16-May	632411	3455735	632351	3455785	y	n	n	n	n	
MB	25-May	632358	3455798	632358	3455747	y	n	n	n	n	
MB	1-Jun	632343	3455776	632418	3455718	y	n	n	n	n	
MB	17-Jun	632424	3455789	632382	3455826	y	n	n	n	n	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
MB	3-Apr	632309	3455683	632299	3455689	y	n	n	n	n	
MB	5-Apr	632331	3455718	632284	3455634	y	n	n	n	n	
MB	10-Apr	632257	3455654	632338	3455647	y	n	n	n	n	
MB	11-Apr	632354	3455671	632270	3455604	y	n	n	n	n	
MB	17-Apr	632250	3455598	632237	3455615	y	n	n	n	n	
MB	24-Apr	632163	3455633	632209	3455589	y	n	n	n	n	
MB	3-May	632245	3455650	632197	3455657	y	n	n	n	n	
MB	17-May	632167	3455623			y	n	n	n	n	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
MB	1-May	632231	3455562	632152	3455567	y	n	n	n		
MB	11-May	632116	3455589	632181	3455562	y	y	n	y	3	
MB	16-May	632160	3455581	632211	3455522	y	n	n	n	3	
MB	17-May	632168	3455543	632135	3455570	y	y	n	n	3	
MB	22-May	632173	3455503	632187	3455532	y	y	n	n	3	
MB	31-May	632205	3455557	632149	3455557	y	y	n	n		
MB	5-Jun	632102	3455575	632119	3455606	y	n	n	n		
MB	6-Jun	632107	3455599	632150	3455536	y	n	n	n	1	
MB	7-Jun	632158	3455492	632098	3455538	y	y	n	n	3	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
MB	30-Apr	632637	3456076	632652	3456036	y	n	n	n		
MB	5-May	632603	3456069	632661	3456024	y	n	n	n		
MB	13-May	632687	3455950	632677	3455998	y	y	n	n		
MB	20-May	632642	3456117	632680	3456714	y	n	n	n	3	
MB	23-May	632598	3456069	632662	3456064	y	y	n	n	3	
MB	2-Jun	632664	3456067			y	y	n	n	2	
MB	8-Jun	632662	3456132			y	n	n	n	3	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
MB	2-Apr	632476	3455774	632499	3455728	y	n	n	n		
MB	6-Apr	632465	3455767	632542	3455826	y	y	n	n		
MB	13-Apr	632473	3455747	632522	3455784	y	y	n	n		
MB	18-Apr	632582	3455869	632499	3455767	y	n	n	y	2	
MB	29-Apr	632450	3455759	632500	3455839	y	n	n	y	2	2 fleg w female
MB	4-May	632475	3455761	632501	3455713	y	n	n	n	2	
MB	9-May	632481	3455756	632526	3455806	y	y	n	n	2	male & female w/ fleg
MB	16-May	632458	3455762	632509	3455764	y	n	n	n	2	
MB	24-May	632442	3455757	632482	3455751	y	n	n	n	2	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
MB	5-Apr	632576	3455711	632605	3455780	y	n	n	n	n	
MB	9-Apr	632645	3455746	632657	3455772	y	n	n	n	n	
MB	22-Apr	632549	3455785	632528	3455776	y	n	n	n	n	
MB	14-May	632575	3455743	632633	3455727	y	n	n	n	n	
MB	26-May	632617	3455765	632618	3455826	y	n	n	n	n	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
MB		632358	3455538	632360	3455516	y	n	n	n	n	
MB		632344	3455541	632313	3455493	y	n	n	n	n	
MB		632336	3455531	632299	3455515	y	n	n	n	n	
MB		632348	3455508	632329	3455461	y	n	n	n	n	
MB		632301	3455508	632375	3455473	y	n	n	n	n	
MB		632291	3455489	632406	3455451	y	n	n	n	n	
MB		632369	3455528	632392	3455404	y	n	n	n	n	
MB		632413	3455539			y	n	n	n	n	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
MB	31-Mar	632690	3455547	632659	3455635	y	y	n	n		
MB	1-Apr	632578	3455585	632665	3455612	y	y	y	n		female w nesting material
MB	10-Apr	632726	3455515	632648	3455610	y	y	n	n		
MB	14-Apr	632705	3455518	632633	3455604	y	n	n	y		male seen flying with food
MB	21-Apr	632629	3455609	632648	3455593	y	n	n	n		
MB	29-Apr	632648	3455620	632655	3455547	y	n	n	n		
MB	7-May	632662	3455597	632672	3455568	y	n	n	n		
MB	11-May	632654	3455547	632602	3455621	y	y	n	y	2	2 young w/female
MB	24-May	632591	3455666	632700	3455607	y	y	n	y	3	
MB	5-Jun	632635	3455649	632726	3455564	y	n	n	n	3	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
MB	31-Mar	632531	3455547	632489	3455598	y	y	n	n	n	
MB	3-Apr	632635	3455534	632503	3455539	y	y	n	n	n	
MB	10-Apr	632525	3455534	632425	3455487	y	n	n	n	n	
MB	17-Apr	632423	3455496	632426	3455524	y	y	n	n	n	
MB	26-Apr	632539	3455498	632491	3455470	y	n	n	n	n	
MB	4-May	632464	3455458	632444	3455462	y	n	n	n	n	
MB	10-May	632442	3455445	632447	3455516	y	n	n	n	n	
MB	16-May	632460	3455492	632479	3455499	y	n	n	n	n	
MB	May-06	632537	3455525	632606	3455530	y	n	n	n	n	
MB	7-Jun	632439	3455544	632572	3455504	y	n	n	n	n	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
MB	11-Apr	632522	3455408	632693	3455435	y	n	n	n		male singing
MB	16-Apr	632639	3455426	632715	3455432	y	y	n	n		"
MB	24-Apr	632641	3455354	632687	3455462	y	n	n	n		"
MB	1-May	632594	3455393	632552	3455408	y	y	n	n		
MB	9-May	632549	3455408	632582	3455399	y	y	n	n		
MB	12-May	632657	3455504	632594	3455435	y	n	n	y	3	
MB	27-May	632585	3455450	632654	3455414	y	n	n	y	3	
MB	4-Jun	632609	3455441	632733	3455441	y	y	n	n		
MB	9-Jun	632712	3455405	632585	3455387	y	y	n	y	3	
MB		632690	3455411			y	n	n	n	3	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
JB	7-Apr	632952	3455562	633042	3455594	y	n	n	n	n	
JB	14-Apr	633083	3455561	633057	3466646	y	n	n	n	n	
JB	17-Apr	632926	3455490	632888	3455498	y	n	n	n	n	
JB	24-Apr	632989	3455594	632867	3455474	y	n	n	n	n	
JB	2-May	633042	3455594	632872	3455499	y	n	n	y	n	
JB	5-May	632947	3455673	632824	3455541	y	n	n	n	n	
JB	12-May	633045	3455566	632921	3455549	y	y	n	y	2	
JB	15-May	632932	3455584	632984	3455542	y	n	n	y	3	
JB	23-May	632980	3455677	632817	3455497	y	n	n	y	3	
JB	24-May	632912	3455531	632844	3455541	y	y	n	y	2	
JB	25-May	632986	3455633	632809	3455482	y	n	n	y	3	
JB	26-May	632973	3455645	632792	3455562	y	n	n	y	3	
JB	30-May	632998	3455662	632942	3455731	y	y	n	y	3	
JB	31-May	632984	3455605	632898	3455461	y	n	n	y	3	
JB	2-Jun	632951	3455583	632915	3455458	y	n	n	y	3	

Observer	Date	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
EH	3.24.06	632769	3455330	y	n	n	n	n	
EH	3.30.06	632785	3455329	y	n	n	n	n	
EH	4.01.06	632806	3455351	y	n	n	n	n	male and female
EH	4.04.06	632824	3455320	y	y	n	n	n	could be boundary
EH	4.04.06	632853	3455323	y	n	n	n	n	female found at 923
EH	4.19.06	632846	3455275	y	n	n	n	n	AT LEAST 2 FLEDG
EH	4.24.06	632799	3455340	y	y	n	n	n	
EH	4.24.06	632759	3455335	y	n	n	n	n	
EH	4.24.06	632802	3455293	y	n	n	n	n	
EH	4.24.06	632799	3455286	y	y	n	n	n	BANDED DATE
EH	4.4.06	632826	3455324	y	n	n	n	n	could be boundary
EH	4.4.06	632854	3455363	y	n	n	n	n	looks like sy
EH	4.5.06	632821	3455343	y	n	n	n	n	female and male
EH	4.6.06	632787	3455318	y	y	n	n	n	
EH	5.11.06	632865	3455330	y	n	n	n	y	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
JB	10-Apr	633086	3455288	633116	3455258	y	n	n	n	n	
JB	11-Apr	632902	3455322	632979	3455331	y	n	n	n	n	
JB	14-Apr	632901	3455444	632992	3466426	y	y	n	n	n	
JB	9-May	632885	3455322	633005	3455464	y	y	n	y	n	
JB	10-May	633128	3455321	633023	3455298	y	y	n	y	3	
JB	12-May	633176	3455329	633179	3455281	y	n	n	y	3	
JB	17-May	633155	3455316	633236	3455239	y	n	n	y	3	
JB	23-May	633150	3455277	633007	3455396	y	n	n	y	2	
JB	25-May	633028	3455327	632999	3455385	y	y	n	y	3	
JB	26-May	632958	3455280	633033	3455384	n	y	n	y	1	
JB	31-May	632940	3455431	632977	3455448	y	n	n	y	3	
JB	7-Jun	633151	3455307	633095	3455358	y	n	n	y	3	
JB	9-Jun	632925	3455388	632947	3455407	y	n	n	y	2	
JB	12-Jun	632970	3455411	632988	3455374	y	n	n	y	2	
JB	13-Jun	633067	3455314	633056	3455371	y	n	n	y	2	
JB	14-Jun	633085	3455314	633034	3455506	y	n	n	y	2	
JB	15-Jun	632920	3455394	632992	3455433	y	n	n	n	n	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
JB	7-Apr	633149	3455604	633161	3455597	y	n	n	n	n	
JB	18-Apr	633336	3455540	633179	3455636	y	n	n	n	n	
JB	3-May	633249	3455584	633246	3455624	y	n	n	n	n	
JB	4-May	633223	3455620	633298	3455615	y	n	n	n	n	
JB	5-May	633106	3455620	633394	3455569	y	n	n	n	n	
JB	8-May	633212	3455615	633294	3455643	n	y	n	n	n	
JB	16-May	633239	3455553	633216	3455669	y	y	n	n	n	
JB	17-May	633200	3455625	633350	3455678	n	y	n	n	n	
JB	19-May	633171	3455601	633377	3455544	y	y	n	n	n	
JB	22-May	633111	3455610	633285	3455585	y	n	n	n	n	
JB	23-May	633283	3455630	633203	3455600	y	n	n	y	2	
JB	24-May	633361	3455555	633255	3455665	y	y	n	y	4	
JB	25-May	633314	3455549	633343	3455653	y	n	n	y	3	
JB	26-May	633304	3455561	633359	3455540	y	n	n	y	3	
JB	7-Jun	633266	3455548	633270	3455569	y	n	n	n	2	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
JB	6-Apr	633325	3455493	633401	3455495	y	n	n	n	n	
JB	1-May	633260	3455421	633362	3455510	y	n	n	y	n	
JB	2-May	633293	3455431	633282	3455412	y	n	n	n	n	
JB	9-May	633351	3455452	633343	3455536	y	n	n	n	n	
JB	10-May	633333	3455420	633420	3455374	y	y	n	n	n	
JB	12-May	633257	3455400	633351	3455464	y	y	n	n	n	
JB	30-May	633411	3455390	633377	3455412	y	n	n	y	3	
JB	5-Jun	633361	3455385	633317	3455373	y	n	n	y	2	
JB	6-Jun	633341	3455398	633293	3455467	y	y	n	y	3	
JB	9-Jun	633336	3455439	633385	3455356	y	y	n	y	3	
JB	12-Jun	633390	3455483	633302	3455492	y	n	n	y	3	
JB	13-Jun	633375	3455448	633369	3455535	y	n	n	y	3	
JB	15-Jun	633404	3455464	633277	3455471	y	n	n	n	n	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
JB	2-May	633498	3455656	633455	3455662	n	n	n	n	n	
JB	5-May	633498	3455684	633460	3455739	n	n	n	n	n	
JB	8-May	633483	3455655	633545	3455757	n	n	n	n	n	
JB	12-May	633544	3455689	633604	3455639	n	n	n	n	n	
JB	15-May	633527	3455710	633600	3455687	n	n	n	n	n	
JB	19-May	633508	3455699	633587	3455643	n	n	n	n	n	
JB	22-May	633557	3455701	633475	3455627	n	n	n	n	n	
JB	30-May	633489	3455653	633452	3455659	n	n	n	n	n	
JB	31-May	633447	3455667	633402	3455663	n	n	n	n	n	
JB	5-Jun	633448	3455699	633564	3455685	n	n	n	n	n	
JB	6-Jun	633423	3455619	633546	3455666	n	n	n	n	n	
JB	8-Jun	633473	3455710	633555	3455662	n	n	n	n	n	
JB	9-Jun	633490	3455720	633566	3455731	n	n	n	n	n	
JB	12-Jun	633524	3455737	633553	3455677	n	n	n	n	n	
JB	13-Jun	633505	3455726	633525	3455683	n	n	n	n	n	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
JB	4-Apr	633543	3455328	633617	3455403	y	n	n	n	n	
JB	5-Apr	633617	3455538	633686	3455444	y	n	n	n	n	
JB	17-Apr	633522	3455434	633563	3455521	y	y	n	n	n	
JB	1-May	633533	3455381	633535	3455395	y	n	n	y	n	
JB	2-May	633544	3455370	633625	3455462	y	n	n	n	n	
JB	17-May	633546	3455566	633583	3455368	y	n	n	y	1	
JB	19-May	633615	3455607	633626	3455415	y	n	n	y	2	
JB	22-May	633599	3455478	633674	3455590	y	y	n	y	4	
JB	26-May	633637	3455605	633636	3455389	y	y	n	y	4	
JB	7-Jun	633477	3455347	633517	3455460	y	y	n	y	4	
JB	8-Jun	633538	3455479	633542	3455467	y	y	n	y	4	
JB	9-Jun	633548	3455407	633506	3455487	y	y	n	y	4	
JB	14-Jun	633543	3455328	633641	3455568	y	n	n	y	3	

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
JB	5-Apr	633502	3455199	633595	3455247	y	n	n	n	n	n
JB	10-Apr	633529	3455215	633423	3455300	y	n	n	n	n	n
JB	11-Apr	633530	3455265	633489	3455243	y	n	n	n	n	n
JB	12-Apr	633410	3455260	633503	3455222	y	n	n	n	n	n
JB	13-Apr	633532	3455225	633362	3455306	y	n	n	n	n	n
JB	18-Apr	633529	3455212	633356	3455226	y	n	n	n	n	n
JB	20-Apr	633531	3455219	633372	3455331	y	n	n	n	n	n
JB	24-Apr	633613	3455242	633457	3455241	y	n	n	n	n	n
JB	25-Apr	633569	3455293	633453	3455272	y	n	n	n	n	n
JB	3-May	633614	3455237	633531	3455220	y	n	n	n	n	n
JB	4-May	633610	3455217	633469	3455237	y	n	n	n	n	n
JB	5-May	633614	3455236	633578	3455271	y	n	n	n	n	n
JB	9-May	633442	3455185	633542	3455213	y	n	n	n	n	n
JB	10-May	633427	3455221	633603	3455265	y	n	n	n	n	n
JB	11-May	633605	3455215	633644	3455253	y	n	n	n	n	n
JB	24-May	633545	3455262	633435	3455270	y	n	n	n	n	n
JB	7-Jun	633586	3455173	633596	3455263	y	n	n	n	n	n
JB	14-Jun	633526	3455239	633445	3455215	y	n	n	n	n	n

Observer	Date	Northing	Easting	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
JB	4-Apr	633793	3455115	633725	3455109	y	y	n	n	n	
JB	6-Apr	633744	3455155	633886	3455161	y	y	y	n	n	
JB	12-Apr	633806	3455103	633644	3455159	y	n	n	n	n	
JB	13-Apr	633646	3455125	633817	3455135	y	y	n	n	n	
JB	17-Apr	633695	3455148	633712	3455090	y	n	n	n	n	
JB	18-Apr	633855	3455147	633637	3455204	y	n	n	n	n	
JB	19-Apr	633695	3455250	633788	3455113	y	n	n	n	n	
JB	20-Apr	633650	3455221	633707	3455116	y	n	n	y	n	
JB	3-May	633662	3455201	633798	3455126	y	n	n	n	n	
JB	8-May	633741	3455310	633641	3455174	y	n	n	n	n	
JB	11-May	633703	3455289	633660	3455150	y	y	n	y	3	
JB	17-May	633731	3455318	633703	3455275	y	n	n	y	3	
JB	18-May	633723	3455241	633719	3455306	y	n	n	y	3	
JB	1-Jun	633681	3455222	633739	3455095	y	n	n	y	3	
JB	5-Jun	633699	3455231	633788	3455147	y	n	n	y	2	
JB	6-Jun	633882	3455120	633776	3455180	y	n	n	y	2	
JB	15-Jun	633902	3455142	633834	3455173	y	n	n	n	n	

Observer	Date	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
EH	3.27.06	631966	3455161	n	n	n	n	n	
EH	3.30.06	631966	3455153	n	n	n	n	n	
EH	3.30.06	631982	3455135	y	y	n	n	n	female and male
EH	3.30.06	631992	3455204	y	y	n	n	n	female and male
EH	3.31.06	631945	3455180	n	n	n	n	n	
EH	4.6.06	631843	3455154	y	y	n	n	n	male and female
EH	5.03.06	631966	3455162	n	n	n	n	n	
EH	5.08.06	632042	3455112	n	y	n	n	y	1 FLEDG
EH	5.08.06	632043	3455090	n	y	n	n	y	1 FLEDG
EH	5.11.06	631843	3455153	n	n	n	n	n	
EH	5.11.06	631844	3455117	n	n	n	n	n	
EH	5.11.06	631861	3455213	n	n	n	n	n	
EH	5.16.06	631924	3455136	n	y	n	n	n	
EH	5.16.06	631937	3455174	n	n	n	n	n	
EH	5.17.06	631793	3455145	y	n	n	n	n	NEST!!!!! MALE SING
EH	5.17.06	631807	3455121	n	n	n	n	n	NOT SURE
EH	5.17.06	631957	3455186	n	n	n	n	n	
EH	5.17.06	631983	3455169	n	n	n	n	n	
EH	5.18.06	631744	3455167	n	n	n	n	n	
EH	5.18.06	631770	3455158	y	n	n	n	n	
EH	5.18.06	631799	3455105	n	n	n	n	n	
EH	5.18.06	631808	3455095	n	n	n	n	n	
EH	5.18.06	631950	3455172	n	n	n	n	n	
EH	5.24.06	631810	3455228	n	n	n	n	n	
EH	5.24.06	631850	3455267	n	n	n	n	n	
EH	5.24.06	631855	3455104	n	n	n	n	n	
EH	5.24.06	631868	3455027	n	n	n	n	n	
EH	5.24.06	631869	3455221	n	n	n	n	n	

Observer	Date	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
EH	5.24.06	631869	3455094	n	y	n	n	y	
EH	5.24.06	631889	3455109	n	n	n	n	n	
EH	5.24.06	631905	3455137	n	n	n	n	n	

Observer	Date	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
EH	4.25.06	632006	3455082	y	n	n	n	n	BANDED THIS DAY
EH	5.02.06	632025	3455119	y	n	n	n	n	FOOD IN MOUTH
EH	5.03.06	632052	3455095	y	n	n	n	n	EDUCATED GUESS
EH	5.03.06	632023	3455099	y	n	n	n	y	AT LEAST 1
EH	5.03.06	632029	3455047	y	n	n	n	y	FEEDING FLEDG
EH	5.03.06	632026	3455042	y	y	n	n	y	
EH	5.08.06	632013	3455078	y	n	n	n	y	2 FLEDG
EH	5.08.06	632035	3455036	y	n	n	n	y	2 FLEDG
EH	5.11.06	632046	3455103	y	n	n	n	y	
EH	5.11.06	631982	3455195	y	n	n	n	y	1 FLEDG
EH	5.11.06	631982	3455195	y	y	n	n	y	1 FLEDG
EH	5.11.06	632046	3455103	y	n	n	n	y	AT LEAST 1
EH	5.12.06	632034	3455085	y	y	n	n	n	FIGHTING W/ MALE NBFLED?
EH	5.16.06	631965	3455137	y	n	n	n	y	AT LEAST 1 FLED
EH	5.16.06	631994	3455170	y	n	n	n	y	AT LEAST 1 FLED
EH	5.16.06	631972	3455161	y	n	n	n	y	GETTING FOOD
EH	5.16.06	631996	3455167	y	n	n	n	y	FEEDING FLEDG
EH	5.16.06	631982	3455080	y	n	n	n	n	
EH	5.18.06	631980	3455139	y	n	n	n	y	AT LEAST 1 FLED
EH	5.23.06	632056	3455224	y	n	n	n	y	W/FLED
EH	5.23.06	631998	3455247	y	n	n	n	y	W/FLED
EH	5.23.06	631964	3454964	y	n	n	n	y	W/FLED
EH	5.23.06	632049	3455101	y	n	n	n	y	

Observer	Date	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
EH	5.22.06	632054	3454985	y	n	n	n	y	FIGHTING W/ YE.WH
EH	5.22.06	632043	3454970	y	n	n	n	y	FIGHTING W/ YE.WH
EH	5.22.06	632027	3454964	y	n	n	n	y	2 SETS OF FLDG YE.WH AND GR.OR
EH	5.24.06	631869	3455094	y	y	n	n	y	3-4 FLD AND FEMALE
EH	5.24.06	631922	3454981	y	n	n	n	n	
EH	5.24.06	631899	3455033	y	n	n	n	y	FIGHTING W/ BK/BL
EH	5.24.06	631886	3455008	y	n	n	n	y	3-4 FLED
EH	5.24.06	631944	3455015	y	n	n	n	y	3-4 FLED
EH	5.24.06	631976	3454996	y	n	n	n	y	3-4 FLED
EH	5.25.06	631919	3455017	y	n	n	n	y	3-4 FLED
EH	5.25.06	631919	3455006	y	n	n	n	y	3-4 FLED
EH	5.25.06	631932	3455040	y	n	n	n	y	3-4 FLED

Observer	Date	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
EH	5.01.06	632190	3454923	y	n	n	n	n	
EH	5.08.06	632140	3455032	y	n	n	n	y	2 FLED
EH	5.08.06	632187	3455043	y	n	n	n	n	
EH	5.08.06	632187	3455043	y	n	n	n	y	2 FLED
EH	5.12.06	632017	3454991	y	n	n	n	y	2 FLED
EH	5.15.06	632007	3455006	y	n	n	n	y	3-4 FLED
EH	5.15.06	631989	3455011	y	n	n	n	y	3-4 FLED
EH	5.16.06	632075	3454932	y	y	n	n	y	FIGHTING W/ RD.RD
EH	5.16.06	632072	3454905	y	n	n	n	y	4-5 FLED

Observer	Date	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
EH	5.16.06	632056	3454871	y	n	n	n	y	4-5 FLED
EH	5.17.06	632083	3454949	y	n	n	n	y	4 FLEDS
EH	5.18.06	631901	3455010	y	n	n	n	y	W/ FLED
EH	5.22.06	631999	3454958	y	n	n	n	y	W/ FLED
EH	5.22.06	631996	3454979	y	n	n	n	y	SINGING
EH	5.22.06	631912	3454949	y	n	n	n	y	W/ 4 FLEDG
EH	5.22.06	632013	3454914	y	n	n	n	y	4 FLEDS
EH	5.23.06	631887	3454959	y	n	n	n	y	4 FLEDS
EH	5.23.06	632064	3454982	y	y	n	n	y	W/FLED AND FEMALE
EH	5.23.06	631964	3454964	y	y	n	n	y	W/ FLED
EH	5.30.06	632080	3455022	y	n	n	n	n	

Observer	Date	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
EH	5.03.06	632170	3454829	y	y	n	n	n	
EH	5.03.06	632151	3454826	y	n	n	n	n	
EH	5.03.06	632165	3454828	y	n	n	n	n	
EH	5.09.06	632014	3454791	y	n	n	n	n	
EH	5.09.06	632107	3454759	y	n	n	n	n	
EH	5.10.06	632170	3454696	y	n	n	n	n	
EH	5.10.06	632171	3454830	y	y	n	n	n	
EH	5.10.06	632172	3454829	y	n	n	n	n	
EH	5.15.06	632175	3454826	y	n	n	n	n	
EH	5.16.06	632075	3454932	y	y	n	n	n	FIGHTING W/ YE.WH
EH	5.16.06	632184	3454801	y	n	n	n	n	
EH	5.22.06	632076	3454901	y	n	n	n	n	
EH	5.25.06	632108	3454873	y	y	n	n	n	
EH	5.25.06	632193	3454837	y	n	n	n	n	

Observer	Date	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
EH	5.25.06	632208	3454843	y	n	n	n	n	
EH	5.25.06	632184	3454792	y	n	n	n	n	
EH	5.25.06	632199	3454841	y	n	n	n	n	
EH	5.25.06	632192	3454833	y	n	n	n	n	
EH	5.25.06	632132	3454834	y	y	n	n	n	FEMALE MAD
EH	5.4.06	632012	3454961	y	n	n	n	n	

Observer	Date	Northing	Easting	Male Obs	Female Obs	Nest Material	Food Delivery	Fledglings	Comments
EH	3.31.06	632099	3455088	y	n	n	n	n	another male close by
EH	4.24.06	632023	3455104	y	n	n	n	n	
EH	4.24.06	632067	3455079	y	n	n	n	n	
EH	5.03.06	632197	3455095	y	n	n	n	n	PROB NBFELG
EH	5.08.06	632187	3455043	y	n	n	n	n	NOT SURE WHO THIS IS
EH	5.08.06	632193	3455073	y	n	n	n	y	2 FLEDG
EH	5.08.06	632112	3455087	y	y	n	n	n	
EH	5.08.06	632132	3455058	y	y	n	n	n	
EH	5.12.06	632016	3455068	y	n	n	n	n	COULD BE NBFLEDG
EH	5.12.06	632203	3455000	y	n	n	n	n	COULD BE NBFLEDG
EH	5.12.06	632165	3455067	y	n	n	n	n	COULD BE NBFLEDG
EH	5.12.06	632034	3455085	y	n	n	n	n	FIGHTING W/ MALE BK.WH
EH	5.15.06	632075	3455085	y	y	n	n	n	NB W/ FEMALE
EH	5.23.06	632049	3455101	y	n	n	n	y	

Appendix C: Nest Monitoring Data

Nest 01			
OBS	DATE	TIME	COMMENTS
MB	10-Apr	600-700	nest found N 632642 E 3456288
MB	13-Apr	600-700	no sign of male or female
MB	17-Apr	600-700	female incubating
MB	24-Apr	600-700	female bringing food to nest
MB	2-May	600-700	male and female bringing food to nest
MB	4-May	600-700	male and female bringing food to nest
MB	7-May	600-700	male and female bringing food to nest 2-3 nestlings
MB	8-May	600-700	young fledged

NEST 02			
OBS	DATE	TIME	COMMENTS
EH	17-May	1042	found female on nest, male singing nearby
EH	18-May	653	female not on nest
EH	25-May	638	female on nest
EH	30-May	705	female on nest
EH	1-Jun	1002	female not on nest
			fate of nest unknown

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14. ABSTRACT

This research on the golden-cheeked warbler (GCW) was conducted on Fort Hood, Texas, during April and June 2006. Subject matter experts on Fort Hood were consulted and helped determine which areas of the installation contained suitable GCW habitat but were not already included in The Nature Conservancy's intensive study program. Researchers then surveyed one of these areas, documenting the presence of GCW. This research was conducted to determine if data collected in the intensive study area has been successfully extrapolated to other areas of habitat on the installation.

The collected data showed that the territory density was lower than those found on TNC's intensive study areas, but pairing success was very similar to the TNC data, and the number of territorial males producing ≥ 1 fledgling was considerably higher than TNC's estimates.

This study supports the possibility of extrapolating TNC's data to areas on Fort Hood that have not been intensively sampled. However, the small scope of this project and relatively low sample size make it necessary to preface the results with one caveat: additional years of data collection on this study site would equate to a higher measure of confidence in the results.

15. SUBJECT TERMS

Golden-cheeked warbler	Fort Hood, TX	bird populations
ecological surveys	The Nature Conservancy (TNC)	National Environmental Policy Act (NEPA)

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